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ABSTRACT

The purpose of this paper is to forecast the number of Hispanic students who will enroll in the Houston Independent School District (HISD) in grades K through 6 in the next five years and to forecast the number of Limited-English-Speaking Ability (LESA) students who will need appropriate educational services. These forecasts are made utilizing simple procedures with student enrollment data that is currently available. These procedures are described in detail. The forecasted enrollment of Hispanic students increases from 31,117 in 1977-78 to 42,678 in 1981-82; the forecasted enrollment of Spanish-speaking LESA students increases from 9,335 in 1977-78 to 12,803 in 1981-82. These forecasts are based on the enrollment of Hispanic students for the last seven years and require the assumption that the enrollment of Hispanic students will follow the same trend for the next five years. (CFM)

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TITLE IV-C Pilot Program: An Educational Needs Projection Model

Project Report

Five-Year Forecast of the Number of Hispanic Students and the Number of LESA Students in HISD - K-6

by

Herbert L. Alston

October 13, 1977

FL009135

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Five-Year Forecast of the Number of Hispanic Students and the Number of LESA Students in HISD - K-6

Introduction

Current state and federal regulations require the identification of Limited-English-Speaking Ability (LESA) students and the provision of appropriate educational services for these students (Alston, 1977a). It is expected that the number of Hispanic families living in the Houston area will increase over the next five years (Stafford & Lehner, 1976) and that an increasing number of Hispanic students will be enrolled in the Houston Independent School District (HISD). Many Hispanic students are LESA students (Alston, 1977b) and consequently the number of LESA students in HISD maybe expected to increase over the five years.

Purpose of Paper

The purpose of this paper is to forecast the number of Hispanic students who will enroll in HISD in grades K through 6 in the next five years and to forecast the number of LESA students who will need appropriate educational services. These forecasts are made utilizing simple prcedures with currently available student enrollment data.

Enrollment Trends

The general trend in enrollment in elementary school (K-6) in HISD, as can be seen in Table 1, increased from 1957-58 to a peak in 1968-69 and has decreased since then. As can also be seen in Table 1, the decrease in enrollment since a peak in 1968-69 seems to have slowed.

Considering the time period from 1970-71 to 1976-77, as can be seen in Table 2, the enrollment of non-Hispanic students has declined while the enrollment of Hispanic students has increased.

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Insert Table 1 and 2 about here

- -

Forecasting Procedures

A number of procedures are available for forecasting (e.g., Correa, 1969; McElroy, 1971; Clark & Schkade, 1969; Johnstone, 1974; Webster, 1970) and computer programs have have been developed for forecasting student enrollment (Gattis & Dunklau, 1975). This paper will consider some simple procedures for forecasting student enrollment with a minimum of data with which to make the forecasts.

McElroy (1971) suggests the following steps for secular trend analysis: State the purpose of the analysis; chart the data; choose the trend equation. Our purpose is to forecast the enrollment of Hispanic and LESA students in HISD in grades K through 6 for the next five years. Figure 1 presents the enrollment of Hispanic students for the previous seven years. Our task is now to choose the trend equation that best fits the data.

- -

Insert Figure 1 about here

- -

Several simple equations can be used to forecast student enrollment. The accuracy of the predictions from each trend equation can be compared to see which equation provides the best fit with the data. Other considerations being equal, the trend equation with the best fit with the data will be used to forecast the future enrollment of Hispanic students. The procedures considered in this paper are the following: (1) the use of a measure of average annual change (harmonic mean) in an exponential equation of the form ab^x ; (2) the use of a linear equation of the form $y = a + bx$; (3) the use of polynomial equations; (4) the use of a linear equation to predict the log of the dependent variable (log $y = a + bx$; and the use of polynomial equations to predict the log of the dependent variable.

Method One

One method for forcasting the future enrollment of students is to calculate the average change in enrollment for the last few years and multiply this average times the current enrollment.

A formula to represent these procedures is (c.f., Clark & Schkade, 1969, p. 668):

$y_c = ab^x$

where y_c is the predicted enrollment;
a is the enrollment in the base year;
b is the geometric mean of the annual change in enrollment minus 1, i.e., (G-1);
x is the number of years from the base year.

$$G = \sqrt[N]{X_1 \cdot X_2 \cdot X_3 \ldots X_N}$$

A formula for calculating the geometic mean is (see McElroy, 1971, p.64):

where G is the geometic mean;
N is the number of time periods; and
X is the change in enrollment from one year to the next.

The geometic mean of the annual rate of change is 1,039 for the past seven years of Hispanic enrollment. This means that the enrollment of Hispanic students increased by an average of 3.9% each year for the last seven years.

Substituting the enrollment of Hispanic students in 1970-71 for a, which was 23,314 students, and G-1 or .039 for b in $y_c = ab^x$, the enrollment for each year from the selected base year may be predicted. As can be seen in Table 3, the use of this trend equation does not produce a good fit to the data on which it was calculated.[1]

- -

Insert Table 3 about here

- -

[1]This trend equation does not fit the data well because the average annual change in Hispanic enrollment is not increasing by at constant rate.

Method Two

A second trend equation for fitting the data is the equation for a straight line (see McElroy, 1971, p. 252-255) $y_c = a + bx$:

where y_c is the predicted enrollment;
a is the value on the y axis intercepted by the least square line of best fit;
b is the slope of the line; and
x is the number of years from the base year.

The calculations for finding a and b are presented in Appendix A. In this case, a equals 22,883 and b equals 961. Substituting these values in the equation, one obtains the predicted enrollment for each year. As can be seen in Table 4, the use of the linear trend equation produces a better fit with the data than Method One.

- -
Insert Table 4 about here
- -

Method Three

Transformation of the dependent and/or independent variables for use in trend equations may result in a linear relationship between the dependent and independent variables may even when the original relationship was nonlinear (see Frank, 1969). Predicting the log of the independent variaable is frequently considered in trend analyses and plotting the relationship of the independent variable (time) with the log of the dependent variable is recommended for time series analyses. Figure 2 represents this relationship.

- -
Insert Figure 2 about here
- -

A third trend equation for fitting the data is to use the equations for a straight line with the log of the dependent variable (see Frank, 1969) $\log y_c = a + bx$.

In this case a equals 1.3609 and b equals .0163. Substituting these values in the equation, one obtains the predicted enrollment for each year. As can be seen in Table 5, the use of this equation produces a better fit with the data than either Methods One or Two.

- -
Insert Table 5 about here
- -

Method Four

A fourth procedure that may be used to produce trend equations is the consideration of polynomial equations. Polynomial equations may be used to approximate curves of other shapes (Kirk, 1968) and have the following general form (see Clark & Schkade, 1969, p. 670)

$$y_c = a + bx + cx^2 + dx^3 + \ldots + jx^m$$

where y_c is the predicted enrollment;
b, c, d through j are regression weights;
a is the value on the y axis intercepted by the regression line; and
x is the number of years from the base year or origin.[2]

The addition of each variable after (a + bx) allows one bend in the line. An equation of the form $(a + bx + cx^2)$ is a second degree equation and allows for one bend in the line fitted to the data.

The calculations for the second degree polynomial equation are presented in Appendix B. In this case a equals 25,335, b equals 977 and equals 108. Substituting these values in the equation, one obtains the predicted enrollment for each year. As can be seen in Table 6, the use of this trend equation produces a better fit than Methods One, Two, or Three.

Calculation of a third degree polynomial equation utilizing the regression programs in the Statistical Packages for the Social Sciences (SPSS) (Nie, Hull, Jenkins, & Steinbrenner & Bent, 1975) indicated that the addition of a third variable (cx^3) did not add significantly to the prediction of the dependent variable. This, however, is probably an artifact due to the fact that the limited number of cases allowed a very good prediction (multiple R = .99877) with the second degree equation. Given a larger number of cases, that is a larger number of enrollment results, a third degree equation would probably have provided a better fit for the data.

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Insert Table 6 about here
- -

Method Five

We may also use polynomial equations to predict the log of the dependent variable. Calculation of a second degree polynomical equation utilizing the SPSS regression program we obtain a value of 1.4038 for a, .0163 for b and .0015 for c. Substituting these values in the equation, one obtains the predicted enrollment for each year. As can be seen in Table 7, the use of this trend equation produces a better fit than methods one, two, three or four.

- -
Insert Table 7 about here
- -

Method Six

Since the enrollment of Hispanic students appears to be increasing at an increasing rate, the equation for an accelerating curve may also be investigated. The formula for average acceleration, distance covered and predicted enrollment follow.

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[2]The selection of a base year or origin and the coding of the independent variable, which is the number of years from the base year or origin, effect the values calculated for the intercept and regression weights.

(c. f., Schaum & Van Der Merwe, 1946, p. 15):[5]

$$a = \frac{v - u}{t}$$

$$s = ut + 1/2\ at^2$$

$$yc = ut + 1/2\ at^2 + c$$

where u is the initial velocity
v is the final velocity
a is the average acceleration
t is the time taken
s is the distance traveled or in this case the increase in enrollment
c is a constant corresponding to initial location or in this case inital enrollment
yc is the final location or enrollment

The calculation of the values used in these equations are presented in Appendix C. In the present case u = 560, v = 1553, a = 165.5 and c = 23, 314. Substituting these values in the equation for e, one obtains the predicted enrollment for each year. As can be seen in Table 8, the use of this trend equation produces a better fit than methods one and two but is not as accurate as methods three, four or five.

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Insert Table 8 about here
- - - - - - - - - - - - - - - - - - - -

Accuracy of the Forecasting Procedures

The accuracy of each trend equation in reproducing the data can be compared. One method for assuring the accuracy or the goodness of fit of each trend equation is to calculate the absolute difference between the predicted enrollment and the actual enrollment. These values are presented in Table 9. As can be seen, method five (a second degree polynomial equation with the log of the dependent variable used as the dependent variable) best fits the data.

- - - - - - - - - - - - - - - - - - - -
Insert Table 9 about here
- - - - - - - - - - - - - - - - - - - -

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[3]The total number of LESA students, Spanish speaking and otherwise, may be estimated by multiplying the forecasted Hispanic enrollment by .3165 instead of .3.

[4]The increase in the proportion of the Hispanic population that are LESA students from 24.7% in 1974 to 30.1% in 1976 may in part be an artifact of the accuracy of reporting the number of LESA students over the last three years.

[5]These equations for acceleration assume that velocity and acceleration are vector quantities, i. e., they have a magnitude and a direction. Student enrollment is a scalor quantity but can only move on one axis, i. e., it can only increase or decrease. Consequently we may use these scalor values in an equation that requires vector values.

Five-Year Forecast of Hispanic Enrollment

Since the trend equation ($\log y_c = 1.4038 + 0.016^3x + .0015x^2$) used with method five produced the best fit with the data on which it was based, and since there is no other reason to prefer one of these methods over another, the method five trend equation was used to forecast the enrollment of Hispanic students in HISD in grades K through 6 for the next five years. As can be seen in Table 10, the forecasted enrollment of Hispanic students K-6 in 1977-78 is 31,117 students and increases to 42,678 students in 1981-82.

- -

Insert Table 10 about here

- -

Five Year Forecasts of LESA Students

Since the 1974-75 school year the school district has reported the number of Limited-English-Speaking-Ability (LESA) students in the district. In 1974, there was 26,210 Hispanic students enrolled in grades K through 6, and 6,476 Spanish speaking LESA students. That is 24.71% of the Hispanic students in K through 6 were considered LESA students. In 1975, there was 27,734 Hispanic students enrolled in grades K through 6 and 7,975 Spanish speaking LESA students. That is, 28.76% of the Hispanic students in K-6 were considered to be LESA students. In 1976, there were 29,287 Hispanic students enrolled in K-6 and 8,816 Spanish speaking LESA students. That is, 30.10% of the Hispanic students in K-6 were considered to be LESA students.

If enrollment data for LESA students were available for a longer period of time, enrollment forecasts could be made with this data. Since this data is not available, forecasts of LESA enrollments may be made by multiplying the forecasted Hispanic enrollment by the percentage of Hispanic students who will probably be Spanish speaking LESA students.

It is possible that the percentage of Hispanic students who are LESA students is increasing. Nonetheless, we can approximate the number of Spanish speaking LESA students by multiplying the number of forecasted Hispanic students by 30%. As can be seen in Table 11, the forecasted number of Spanish speaking LESA students in 1977-78 is 9,335 and increases to 12,803 in 1981-82.[3,4]

- -

Insert Table 11 about here

- -

Caveat

The forecast of enrollment made in this paper are based on a number of assumptions. An assumption of major importance is that the trend in enrollment of Hispanic students for the last seven years will continue for the next five years. Given the current economic conditions in Houston and Mexico, President Carter's citizenship policy for Mexican-Americans and the expected population explosion in Mexico, the number of Mexican-American families, both citizens and aliens, moving to Houston and enrolling their children in HISD may well exceed those forecasts. For the same reasons we may expect the percentage of Hispanic students who are LESA students to increase and consequently the number of LESA students forecasted will be an underestimate.

Other limitations of this study include the small number of years on which the trend equation is based, possible limitations of the selected trend equation to project a trend that is increasing at an increasing rate, and inaccuracies in the number of LESA students identified in previous years. None of these assumptions and limitations should rule out the judicious use of the forecasts made in this paper.

Summary

To plan to meet the needs of students, forecasts of future enrollments are needed. This paper forecasts the enrollment of Hispanic and Spanish speaking LESA students for the next five years. The forecasted enrollments are presented in Table 11.

As can be seen in Table 11, the forecasted enrollment of Hispanic students increases from 31,117 in 1977-78 for 42,678 in 1981-82, and the forecasted enrollment of Spanish speaking LESA students increases from 9,335 in 1977-78 to 12,803 in 1981-82.

These forecasts are based on the enrollment of Hispanic students for the last seven years and require the assumption that the enrollment of Hispanic students will follow the same trend for the next five years. Economical, political, and social conditions may futher increase the enrollment of Hispanic students and the percentage of Hispanic students who are LESA students. In this case the estimate of the number of students to be served will be an underestimate.

References

Alston, H. L., Student Data Requirements of Lau Remedies and Texas Senate Bill 121, 1977a.

Alston, H. L., Estimates of the Number of LESA Students in HISD (K-3), 1977b.

Clark, C. T. & Schkade, L. L., Statistical Methods for Business Decisions, Cincinnati, Ohio: South-Western Pub. Co., 1969.

Correa, H., Quantitative Methods of Educational Planning, Scranton, Pennsylvania: International Textbooks Co., 1969.

Frank, R. E., Use of Transformation. Journal of Marketing Research, 1966, 3, 247-253.

Gattis, W. D. & Dunklau, M. W., Enrollment and Facilities Projection Program: General Description and Users Guide, Dallas ISD, 1975.

Johnstone, J. N., Mathematical Models Developed for Use in Educational Planning: A Review of Educational Research, 1974, 44 (2), 177-201.

Kirk, R., Experimental Design: Procedures for the Behavioral Sciences, Belmont, Calif., Brooks/Cole, 1968.

McElroy, E. E., Applied Business Statistics, San Francisco, California: Holden-Day, 1971.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H., Statistical Package for the Social Services (2nd ed.), New York: McGraw-Hill, 1975.

Schaum, D., & Van Der Merwe, C. W. Schaum's Outline of Theory and Problems for Students of College Physics. (5th ed.) New York, N.Y.: Schaum Pub. Co., 1946.

Stafford, J.E. & Lehnen, R. G., Houston Community Study, Alumni Educational Foundation, University of Houston, 1976

Webster, W. J., The Cohort-Survival Ration Method in the Projection of School Attendance, Journal of Experimental Education, 1970, 39, 89-96.

APPENDICES

Appendix A

Calculation of Linear Trend

The calculation of a linear trend is based on the equation $y_c = a + bx$. The formulas for finding the values for a and b are : $Ey = Na + b\,Ex$ and $Exy = aEx + b\,Ex^2$ (see McElroy, 1971, p. 252).**

Year	Enrollment* Y	X	X^2	Xy	Predicted Trend Yc
1970	23.314	0	0	0	22.883
71	23.874	1	1	23.874	23.844
72	24.491	2	4	48.982	24.805
73	25.450	3	9	76.35	25.766
74	26.210	4	16	104.84	26.727
75	27.734	5	25	138.67	27.688
76	29.287	6	36	175.722	28.649
Totals	Ey=180.36	Ex=21	Ex^2=91	Exy=567.988	

Step (1) $Ey = Na + bEx$
$Exy = aEx + b\,Ex^2$

substitute values and solve for b

Step (2) $180.36 = 7a + 21b$
$567.988 = 21a + 91b$

eliminate a

Step (3) $567.988 = 21a + 91b$
$-543.080 = 21a + 63b$
$26.908 = 28b$
$0.961 = b$

Step (4) substitute the value of b and solve for a

$180.36 = 7a + 21\,(0.961)$
$180.36 - [21\,(0.961)] = 7a$

$22.883 = a$

Step (5) $yc = a + bx = 22.883 + 0.961\,(x)$

where X is the number of years from the base year

for example:

Step (6) $y_c\,(1975) = 22.883 + 0.961\,(5) = 27.688$

* 23,314 is written as 23.314 for convenience.

**The letter E is used for the Greek letter sigma meaning in this context to sum or the sum of.

Appendix B

Calculation of Polynomial Equation

The calculation of a second degree polynomial equation is based on the equation $y_c = a + bx + cx^2$. The formulas for finding the values of a,b and c are: $Ey = Na + c\,Ex^2$; $b = Exy/Ex^2$; and $Ex^2y = a\,Ex^2 + c\,Ex^4$ (see McElroy, 1971, p. 261).**

Year	Y*	X	X^2	X^4	Xy	X^2 y	Y_c
70	23.314	-3	9	81	-69.942	209.826	23.376
71	23.784	-2	4	16	-47.748	95.496	23.813
72	24.491	-1	1	1	-24.491	24.491	24.466
73	25.450	0	0	0	0	0	25.335
74	26.210	1	1	1	26.210	26.210	26.420
75	27.734	2	4	16	55.468	110.936	27.721
76	29.287	3	9	81	87.861	263.583	29.238
Totals	Ey=180.36	Ex=0	Ex^2=28	Ex^4=196	Exy=27.358	Ex^2y=730.542	

STEP (1) $Ey = Na + c\,Ex^2$ $\qquad Ex^2y = aEx^2 + cEx^4$

$b = Exy / Ex$

substitute values and solve for b

Step (2) $b = Exy/ Ex^2 = 27.358/28 = 0.977$

substitute values

Step (3) $180.36 = 7a + 28c$

$730.542 = 28a + 196c$

solve for c

Step (4) $730.542 = 28c + 196c$

$-721.440 = 28a + 112c$

$9.102 = 84c$

$0.108 = c$

substitute values and solve for a

Step (5) $730.542 = 28a + 196c$

$730.542 - [196\ (0.108)] = 28a$

$25.335 = a$

Step (6) $y_c = a + bx + cx^2 = 25.335 + 0.977x + 0.108x^2$

where x is the number of years from the base year

for example:

Step (7) $y_c\ (1975) = 25.335 + 0.977\ (2) + 0.108\ (4) = 29.238$

which is actually 29,238

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* 23,314 is written as 23.314 for convenience.

**The letter E is used for the Greek letter sigma meaning in this context to sum or the sum of.

Appendix C

Calculation of Accelerating Curve

The calculation of a curve that is increasing at a constantly increasing rate is based on the equation $yc = ut + 1/2\ at^2 + c$. The formula for finding the value of a is: $a = (v - u)/t$ (see Schaum & Van Der Merive, 1946, p.15).

Year	Actual Enrollment	Change Per Year	t	Predicted Enrollment
70	23,314	-	0	23,314
71	23,874	560	1	23,957
72	24,491	617	2	24,765
73	25,450	959	3	25,739
74	26,210	760	4	26,878
75	27,734	1524	5	28,183
76	29,287	1553	6	29,653

step (1) $a = (v - u)/t$ where $v = 1553$

$= (1553 - 560)/6$ $u = 560$

$= 165.5$ $c = 23,314$

Step (2) $yc = ut + 1/2\ at^2 + c$

for example:

$yc\ (1975) = (560)(5) + 1/2\ (165.5)(5)^2 + 23,314$

$= 28,182.75$

$= 28,183$

TABLE 1

Enrollment of Elementary School (K-6)
Students in HISD*

Year**	Enrollment	Change in Enrollment
57	101,139	
58	108,221	+7082
59	113,428	+5207
60	118,697	+5269
61	124,463	+5766
62	131,654	+7191
63	136,708	+5054
64	138,935	+2227
65	144,186	+5251
66	147,677	+3491
67	150,515	+2838
68	151,612	+1097
69	146,862	-4750
70	144,199	-2663
71	136,959	-7240
72	131,053	-5906
73	124,441	-6612
74	119,839	-4602
75	118,042	-1797
76	116,437	-1605

*Based on peak enrollment data from the Pupil Accounting Department.
**Note that "57" refers to the 1957-58 school year.

TABLE 2

Enrollment of Hispanic and Non-Hispanic Students (K-6) 1970-1976

Year	Enrollment of Non-Hispanic Students	Percent Change	Enrollment of Hispanic Students	Percent Change
70	120,885		23,314	
71	113,085	-6.5%*	23,874	+2.4%**
72	106,562	-5.8%	24,491	+1.7%
73	98,991	-7.1%	25,450	+3.9%
74	93,629	-5.4%	26,210	+3.0%
75	90,308	-3.5%	27,734	+5.8%
76	87,150	-3.5%	29,287	+5.6%

*113,085 is 93.5% of 120,885 and this indicates a 6.5% decrease in enrollment; similarly 106,562 is 94.2% of 113,085 and this indicates a 5.8% decrease in enrollment, etc.

**23,874 is 102.4% of 23,314 and this indicates a 2.4% increase in enrollment; similarly 24,491 is 101.7% of 23,874 and this represents an increase of 1.7% in enrollment, etc.

Figure 1
Enrollment of Hispanic Students K-6

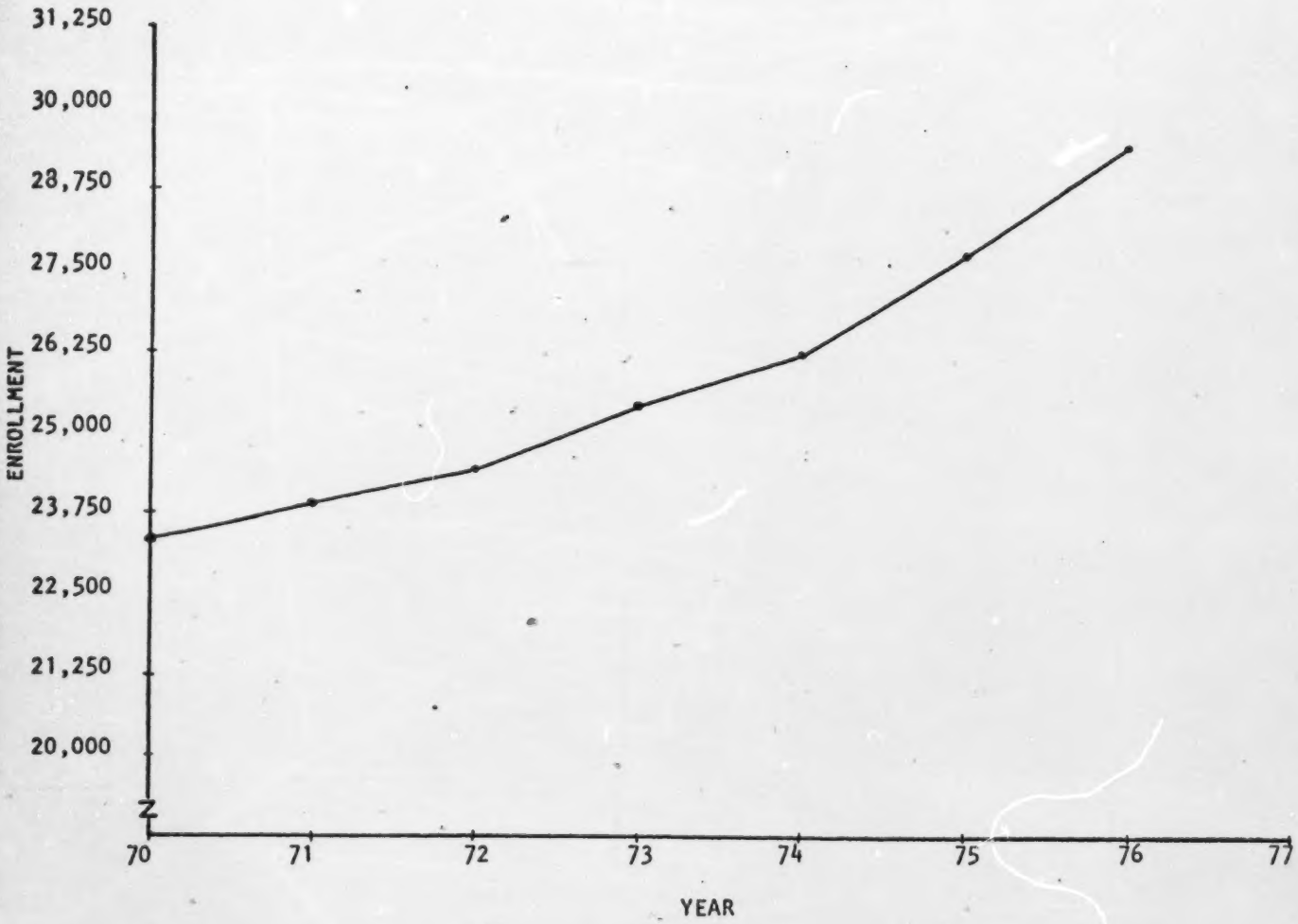

TABLE 3

Fit of Predicted and Actual Enrollment
Based on Method One

Year	Actual Enrollment	Predicted Enrollment	Absolute Difference
70	23,314	-	-
71	23,874	24,223	349
72	24,491	25,168	677
73	25,450	26,150	700
74	26,210	27,169	959
75	27,734	28,229	495
76	29,287	29,330	43

Figure 2

Log of Enrollment of Hispanic Students

K-6 Over Time

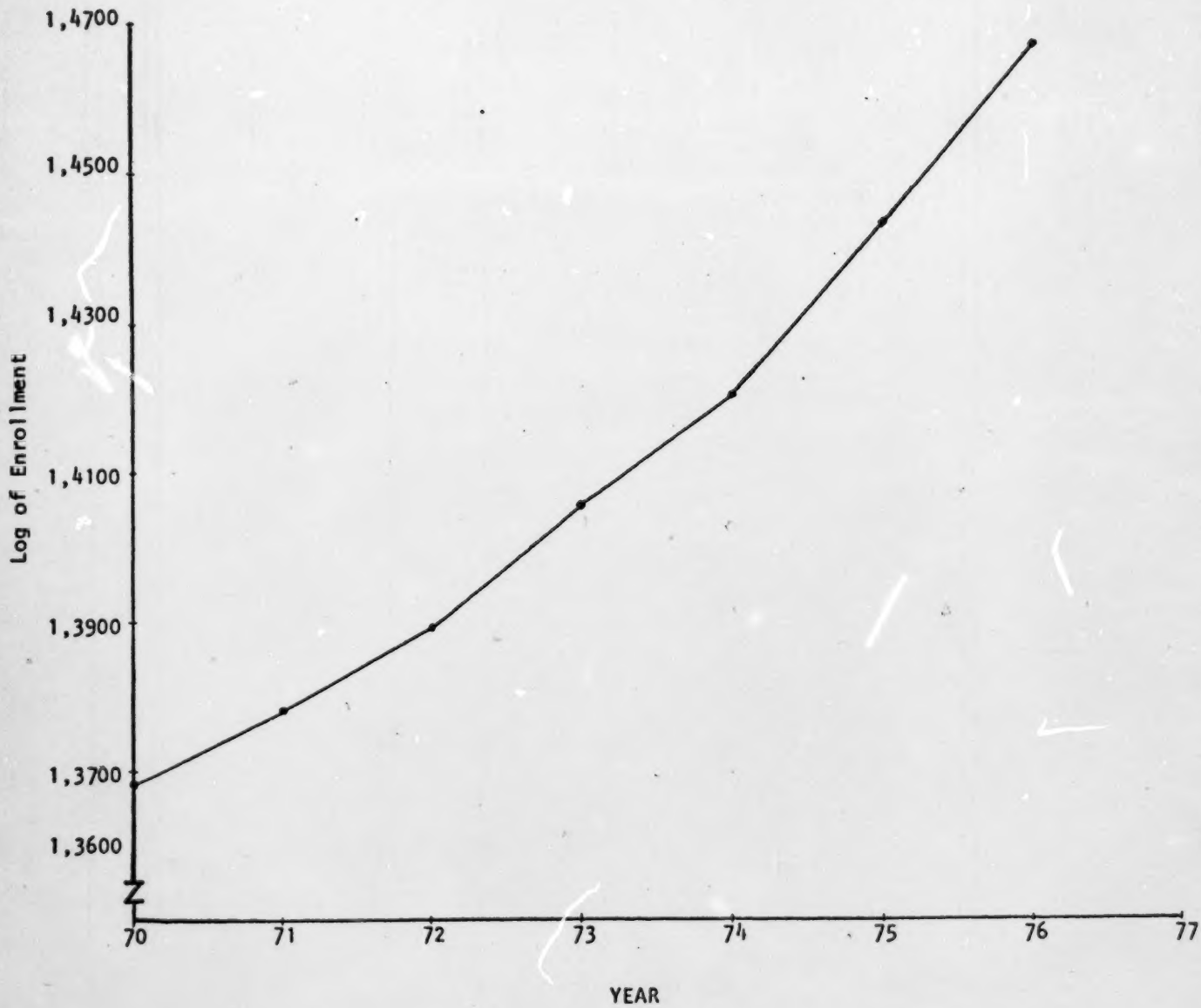

Table 4

Fit of Predicted and Actual Enrollment
Based on Method Two

Year	Actual Enrollment	Predicted Enrollment	Absolute Difference
70	23,314	22,883	431
71	23,874	23,884	30
72	24,491	24,805	314
73	25,450	25,766	316
74	26,210	26,727	517
75	27,734	27,688	46
76	29,287	28,649	638

Table 5

Fit of Predicted and Actual Enrollment
Based on Method Three

Year	Actual Enrollment	Predicted Enrollment	Absolute Difference
70	23,314	22,956	358
71	23,874	23,834	40
72	24,491	24,746	255
73	25,450	25,692	242
74	26,210	26,675	465
75	27,734	27,695	39
76	29,287	28,754	533

Table 6

Fit of Predicted and Actual Enrollment
Based on Method Four

Year	Actual Enrollment	Predicted Enrollment	Absolute Difference
70	23,314	23,376	62
71	23,874	23,813	61
72	24,491	24,466	25
73	25,450	25,335	115
74	26,210	26,420	210
75	27,734	27,721	13
76	29,287	29,238	49

Table 7

Fit of Predicted and Actual Enrollment
Based on Method Five

Year	Actual Enrollment	Predicted Enrollment	Absolute Difference
70	23,314	23,356	42
71	23,874	23,834	40
72	24,491	24,491	0
73	25,450	25,340	110
74	26,210	26,400	190
75	27,734	27,695	39
76	29,287	29,255	32

Table 8
Fit of Predicted and Actual Enrollment
Based on Method Six

Year	Actual Enrollment	Predicted Enrollment	Absolute Difference
70	23,314	23,314	0
71	23,874	23,957	83
72	24,491	24,765	274
73	25,450	25,739	289
74	26,210	26,878	668
75	27,734	28,183	449
76	29,287	29,653	366

Table 9
Absolute Difference Between Predicted
Enrollment and Actual Enrollment*

Year	METHODS					
	One	Two	Three	Four	Five	Six
70	-	431	358	62	42	0
71	349	30	40	61	40	83
72	677	314	255	25	0	274
73	700	316	242	115	110	289
74	959	517	465	210	190	668
75	495	46	39	13	39	449
76	43	638	533	49	32	366
	E=3223	E=2292	E=1932	E=535	E=453	E=2129
	$\bar{X}$= 537.2	$\bar{X}$=327.4	$\bar{X}$= 276.0	$\bar{X}$=76.4	$\bar{X}$=64.7	$\bar{X}$=304.14

*The letter E is used for the Greek letter sigma, which in this context means the sum of.

Table 10

Forecasted Enrollment of Hispanic Students in HISD K-6*

Year	Actual Enrollment	Predicted Enrollment
76	29,287	29,255
77	-	31,117
78	-	33,327
79	-	35,942
80	-	39,030
81	-	42,678

*The trend equation used was $\log y_c = 1.4038 + 0.0163x + .0015x^2$, where x is the number of years from the base year. The base year for these calculations (which is determined by the coding of X in the original equation) was 1973.

Table 11

Forecasted Enrollment of Spanish Speaking
LESA Students in HISD K-6

Year	Forecasted Hispanic Enrollment	Forecasted LESA Enrollment
77	31,117	9,335
78	33,327	9,998
79	35,942	10,783
80	39,030	11,709
81	42,678	12,803